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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,928	06/07/2006	Koichi Shibayama	MIY-0212	1990

74384 7590 05/20/2009

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EXAMINER	
FEELY, MICHAEL J	

ART UNIT	PAPER NUMBER
1796	

MAIL DATE	DELIVERY MODE
05/20/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/581,928	SHIBAYAMA ET AL.	
	Examiner	Art Unit	
	Michael J. Feely	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Pending Claims

Claims 1, 2, and 4-12 are pending.

Response to Amendment

1. The rejection of claim 3 under 35 U.S.C. 102(b) as being anticipated by Akaho et al. (WO 03/066741 A1) has been rendered moot by the cancellation of this claim.

2. The rejection of claim 3 under 35 U.S.C. 102(b) as being anticipated by Yonezawa et al. (WO 02/46312 A1) has been rendered moot by the cancellation of this claim.

3. The rejection of claim 3 under 35 U.S.C. 102(a) as being anticipated by Yonezawa et al. (US 2004/0053061 A1) has been rendered moot by the cancellation of this claim.

4. The provisional rejection of claim 3 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the combined limitations of claims 1-14, 16, 17, 19-24, 31, and 32 of copending Application No. 10/503,490 (US 2005/0107497 A1) has been rendered moot by the cancellation of this claim.

5. The provisional rejection of claim 3 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the combined limitations of claims 27, 28, 42, and 43 of copending Application No. 10/433,956 (US 2004/0053061 A1) as been rendered moot by the cancellation of this claim.

Response to Arguments

6. Applicant's arguments, see the bottom half of page 7 of the response, filed March 6, 2009, with respect to the *epoxy equivalent weight* limitation have been fully considered; however, they are not persuasive.

Yonezawa et al. feature Epikote 1007 in their examples, and Akaho et al. feature DER 331 in their Examples. Both of these materials feature and epoxy equivalent weight *(epoxy molar mass)* that falls within the instantly claimed range of 100-2,000 - *see attached product information sheets*.

7. Applicant's arguments, see the bottom of page 6 through the top half of page 7 and page 8 of the response, filed March 6, 2009, with respect to the prior art rejections of claim 3 have been fully considered and are persuasive. The limitations of cancelled claim 3 are now featured in the independent claim.

Yonezawa et al. and Akaho et al. contemplate the use dicyclopentadiene cresol novolaks *(and their derivatives)* as phenolic hardeners. Although these materials are structurally *similar* to instantly claimed *Chemical 2*, they are not the same. Specifically, the materials of the prior art feature cresol units *(phenolic rings with a methyl group)*, while the materials of the instant invention feature phenol units *(with no methyl substitution)*. Therefore, the following rejections have been withdrawn:

- The rejection of claims 1, 2, 4-8, and 12 under 35 U.S.C. 102(b) as being anticipated by Akaho et al. (WO 03/066741 A1) has been withdrawn/overcome by amendment.
- The rejection of claims 1, 2, 4-8, and 12 under 35 U.S.C. 102(b) as being anticipated by Yonezawa et al. (WO 02/46312 A1) has been withdrawn/overcome by amendment.

- The rejection of claims 1, 2, 4-8, and 12 under 35 U.S.C. 102(a) as being anticipated by Yonezawa et al. (US 2004/0053061 A1) has been withdrawn/overcome by amendment.
- The rejection of claims 9-11 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Akaho et al. (WO 03/066741 A1) or Yonezawa et al. (WO 02/46312 A1) has been withdrawn/overcome by amendment.
- The rejection of claims 9-11 under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yonezawa et al. (US 2004/0053061 A1) has been withdrawn/overcome by amendment.
- The provisional rejection of claims 1, 2, and 4-12 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the combined limitations of claims 1-14, 16, 17, 19-24, 31, and 32 of copending Application No. 10/503,490 (US 2005/0107497 A1) has been withdrawn/overcome by amendment.
- The provisional rejection of claims 1, 2, and 4-12 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the combined limitations of claims 27, 28, 42, and 43 of copending Application No. 10/433,956 (US 2004/0053061 A1) has been withdrawn/overcome by amendment.

However, upon further consideration, a new ground(s) of rejection is made in view of Nagai et al. (JP 62-096521).

Claim Rejections - 35 USC § 103

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 1, 2, and 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akaho et al. (WO 03/066741 A1) in view of Nagai et al. (JP 62-096521).

US 2005/0107497 A1 is the US and English-language equivalent for this WIPO document, and it has been relied upon as a translation document. Accordingly, all citations are directed to the US publication.

Regarding claims 1, 2, 4-8 and 12, Akaho et al. disclose: ***(1)*** a thermosetting resin composition (Abstract; paragraph 0029) characterized as containing an epoxy resin (paragraphs 0051-0063) having an epoxy equivalent weight of 100 - 2,000 (paragraphs 0051-0063; Example 2), an epoxy hardener in the form of a compound having a phenol group (paragraphs 0064, 0072), and a layered silicate in the amount of 0.2 - 100 parts by weight, based on 100 parts by weight of resin constituents including said epoxy resin and epoxy hardener (paragraphs 0088, 0107-0108, 0119);

(2) characterized in that said epoxy resin contains at least one type selected from the group consisting of a bisphenol epoxy resin, biphenyl epoxy resin, dicyclopentadiene epoxy resin and naphthalene epoxy resin (paragraphs 0051-0063; Example 2);

(4) characterized in that said layered silicate comprises at least one type selected from the group consisting of montmorillonite, hectorite, swelling mica and vermiculite (paragraphs 0088, 0107-0108, 0119);

(5) characterized in that said layered silicate contains at least one type of ammonium salt selected from the group consisting of alkyl ammonium salt containing 6 or more carbon atoms, aromatic quaternary ammonium salt and heterocyclic quaternary ammonium salt (paragraphs 0094-0097);

(6) a resin sheet characterized as comprising the thermosetting resin composition as recited in any one of claims 1-5 (Abstract; paragraph 0029); ***(7)*** a resin sheet characterized in that it is obtained by curing the resin sheet as recited in claim 6 (Abstract; paragraph 0029; Examples); ***(8)*** characterized in that a part or all of said layered silicate is dispersed in the form of a stack consisting of 5 or less layers and has a mean interlayer spacing of at least 3 nm along the (001) plane when measured by a wide-angle X-ray diffraction method (paragraphs 0088, 0107-0108, 0119); and ***(12)*** a resin sheet for insulating substrate, characterized as comprising the resin sheet as recited in claim 6 (Abstract; paragraph 0029; Examples).

The phenolic resin hardeners contemplated by Akaho et al. include dicyclopentadiene cresol novolaks *and their derivatives (see paragraph 0072)*. These are structurally similar to instantly claimed *Chemical 2*; however, Akaho et al. fail to disclose: ***(1)*** wherein said epoxy hardener comprises at least one type selected from the group consisting of hydrophobic phenol compounds represented by the following formulas (1)-(3).

Nagai et al. disclose a similar filled epoxy resin composition. They specifically use a dicyclopentadiene-type phenolic hardener corresponding to the instantly claimed *Chemical 2 (see Abstract: when R is H)* or a dicyclopentadiene-type phenolic hardener corresponding to the dicyclopentadiene cresol novolaks of Akaho et al. *(see Abstract: when R is lower alkyl, such as CH_3)*. These phenolic hardeners yield a cured product that is excellent in heat resistance, moisture resistance, and adhesion to copper foil. Furthermore, they are suitable for printed wiring board applications.

The teachings of Nagai et al. establish that the dicyclopentadiene cresol novolaks of Akaho et al. and the instantly claimed *Chemical 2* are recognized in the art as functional

equivalents. Specifically, they both act as hardeners for filled epoxy resin compositions, yielding advantageous properties in the manufacturing of printed wiring boards. In light of this, it has been found that combining or substituting functional equivalents known for the same purpose is *prima facie* obvious - *see MPEP 2144.06*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use instantly claimed *Chemical 2* in the composition of Akaho et al. because: (a) Akaho et al. disclose the use of dicyclopentadiene cresol novolaks, which are structurally similar to instantly claimed *Chemical 2*; (b) Nagai et al. disclose a similar filled epoxy resin composition wherein a dicyclopentadiene-type phenolic hardener corresponding to the instantly claimed *Chemical 2* or a dicyclopentadiene-type phenolic hardener corresponding to the dicyclopentadiene cresol novolaks of Akaho et al. are presented as function equivalents; and (c) it has been found that combining or substituting functional equivalents known for the same purpose is *prima facie* obvious.

Regarding claims 9 and 10, the combined teachings of Akaho et al. and Nagai et al. are as set forth above and incorporated herein. The combined teachings fail to explicitly disclose the following properties: ***(9)*** characterized in that it exhibits a mean linear expansion coefficient ($\alpha 1$) of not exceeding 4.0 x 10^{-5}/°C over a temperature range that is 10-50 °C lower than a glass transition temperature of a cured product of said thermosetting resin composition; and ***(10)*** characterized in that it exhibits a mean linear expansion coefficient ($\alpha 2$) of not exceeding 4.0 x 10^{-5}/°C over a temperature range that is 10-50 °C higher than a glass transition temperature of a cured product of said thermosetting resin composition.

Akaho et al. disclose overlapping ranges for these properties *(see paragraphs 0031-0036 of Akaho et al.)*. Furthermore, they satisfy all of the material/chemical limitations of the instant invention. In light of this, it has been found that, "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present – *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Therefore, it appears that the instantly claimed properties would have been satisfied by the combined teachings of Akaho et al. and Nagai et al. because these references obviously satisfy all of the material/chemical limitations of the instant invention.

Regarding claim 11, the combined teachings of Akaho et al. and Nagai et al. fail to explicitly disclose the following property: ***(11)*** characterized in that a cured product of said thermosetting resin composition exhibits a dielectric constant at 1 GHz of not exceeding 3.3 and a dielectric loss tangent at 1 GHz of not exceeding 0.015. However, it appears that this property would have been satisfied by these references because they satisfy all of the material/chemical limitations of the instant invention.

Therefore, it appears that the instantly claimed properties would have been satisfied by the combined teachings of Akaho et al. and Nagai et al. because these references obviously satisfy all of the material/chemical limitations of the instant invention.

10. Claims 1, 2, and 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yonezawa et al. (WO 02/46312 A1 or US 2004/0053061 A1) in view of Nagai et al. (JP 62-096521).

US 2004/0053061 A1 is the US and English-language equivalent for this WIPO document, and it has been relied upon as a translation document. Accordingly, all citations are directed to the US publication.

Regarding claims 1, 2, 4-8 and 12, Yonezawa et al. disclose: ***(1)*** a thermosetting resin composition (Abstract; paragraph 0010) characterized as containing an epoxy resin (paragraphs 0043-0055) having an epoxy equivalent weight of 100 - 2,000 (paragraphs 0043-0055; Examples 6-11), an epoxy hardener in the form of a compound having a phenol group (paragraphs 0056, 0064), and a layered silicate in the amount of 0.2 - 100 parts by weight, based on 100 parts by weight of resin constituents including said epoxy resin and epoxy hardener (paragraphs 0080, 0101-0102, 0111-0113);

(2) characterized in that said epoxy resin contains at least one type selected from the group consisting of a bisphenol epoxy resin, biphenyl epoxy resin, dicyclopentadiene epoxy resin and naphthalene epoxy resin (paragraphs 0043-0055; Examples 6-11);

(4) characterized in that said layered silicate comprises at least one type selected from the group consisting of montmorillonite, hectorite, swelling mica and vermiculite (paragraphs 0080, 0101-0102, 0111-0113);

(5) characterized in that said layered silicate contains at least one type of ammonium salt selected from the group consisting of alkyl ammonium salt containing 6 or more carbon atoms,

aromatic quaternary ammonium salt and heterocyclic quaternary ammonium salt (paragraphs 0087-0089);

(6) a resin sheet characterized as comprising the thermosetting resin composition as recited in any one of claims 1-5 (Abstract; paragraph 0010; Examples); ***(7)*** a resin sheet characterized in that it is obtained by curing the resin sheet as recited in claim 6 (Abstract; paragraph 0010; Examples); ***(8)*** characterized in that a part or all of said layered silicate is dispersed in the form of a stack consisting of 5 or less layers and has a mean interlayer spacing of at least 3 nm along the (001) plane when measured by a wide-angle X-ray diffraction method (paragraphs 0080, 0101-0102, 0111-0113); and ***(12)*** a resin sheet for insulating substrate, characterized as comprising the resin sheet as recited in claim 6 (Abstract; paragraph 0010; Examples).

The phenolic resin hardeners contemplated by Yonezawa et al. include dicyclopentadiene cresol novolaks *and their derivatives (see paragraph 0064)*. These are structurally similar to instantly claimed *Chemical 2*; however, Yonezawa et al. fail to disclose: ***(1)*** wherein said epoxy hardener comprises at least one type selected from the group consisting of hydrophobic phenol compounds represented by the following formulas (1)-(3).

Nagai et al. disclose a similar filled epoxy resin composition. They specifically use a dicyclopentadiene-type phenolic hardener corresponding to the instantly claimed *Chemical 2 (see Abstract: when R is H)* or a dicyclopentadiene-type phenolic hardener corresponding to the dicyclopentadiene cresol novolaks of Yonezawa et al. *(see Abstract: when R is lower alkyl, such as CH_3)*. These phenolic hardeners yield a cured product that is excellent in heat resistance,

moisture resistance, and adhesion to copper foil. Furthermore, they are suitable for printed wiring board applications.

The teachings of Nagai et al. establish that the dicyclopentadiene cresol novolaks of Yonezawa et al. and the instantly claimed *Chemical 2* are recognized in the art as functional equivalents. Specifically, they both act as hardeners for filled epoxy resin compositions, yielding advantageous properties in the manufacturing of printed wiring boards. In light of this, it has been found that combining or substituting functional equivalents known for the same purpose is *prima facie* obvious - *see MPEP 2144.06.*

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use instantly claimed *Chemical 2* in the composition of Yonezawa et al. because: (a) Yonezawa et al. disclose the use of dicyclopentadiene cresol novolaks, which are structurally similar to instantly claimed *Chemical 2*; (b) Nagai et al. disclose a similar filled epoxy resin composition wherein a dicyclopentadiene-type phenolic hardener corresponding to the instantly claimed *Chemical 2* or a dicyclopentadiene-type phenolic hardener corresponding to the dicyclopentadiene cresol novolaks of Yonezawa et al. are presented as function equivalents; and (c) it has been found that combining or substituting functional equivalents known for the same purpose is *prima facie* obvious.

Regarding claims 9 and 10, the combined teachings of Yonezawa et al. and Nagai et al. are as set forth above and incorporated herein. The combined teachings fail to explicitly disclose the following properties: ***(9)*** characterized in that it exhibits a mean linear expansion coefficient ($\alpha 1$) of not exceeding 4.0×10^{-5}/°C over a temperature range that is 10-50 °C lower than a glass transition temperature of a cured product of said thermosetting resin composition; and ***(10)***

characterized in that it exhibits a mean linear expansion coefficient ($\alpha 2$) of not exceeding 4.0 x 10^{-5}/°C over a temperature range that is 10-50 °C higher than a glass transition temperature of a cured product of said thermosetting resin composition.

The combined teachings satisfy all of the material/chemical limitations of the instant invention. In light of this, it has been found that, "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present – *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Therefore, it appears that the instantly claimed properties would have been satisfied by the combined teachings of Yonezawa et al. and Nagai et al. because these references obviously satisfy all of the material/chemical limitations of the instant invention.

Regarding claim 11, the combined teachings of Yonezawa et al. and Nagai et al. fail to explicitly disclose the following property: ***(11)*** characterized in that a cured product of said thermosetting resin composition exhibits a dielectric constant at 1 GHz of not exceeding 3.3 and a dielectric loss tangent at 1 GHz of not exceeding 0.015. However, it appears that this property would have been satisfied by these references because they satisfy all of the material/chemical limitations of the instant invention.

Therefore, it appears that the instantly claimed properties would have been satisfied by the combined teachings of Yonezawa et al. and Nagai et al. because these references obviously satisfy all of the material/chemical limitations of the instant invention.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Feely whose telephone number is (571)272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael J Feely/
Primary Examiner, Art Unit 1796

May 19, 2009